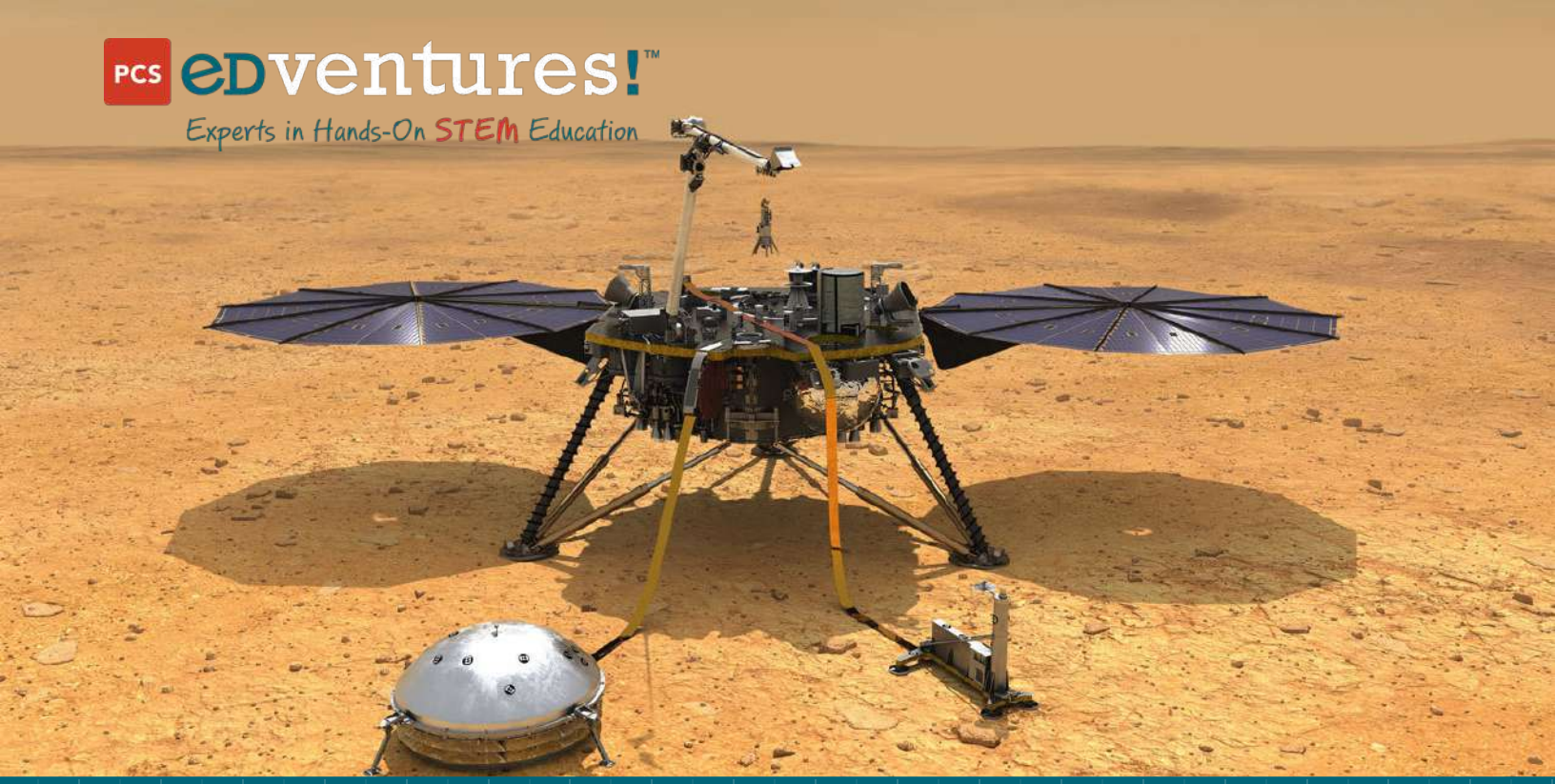
PCS eDventures!™
Experts in Hands-On STEM Education



Martian Weather Report

Mars is easily one of the most famous planets in our solar system. For years, people have dreamed of traveling there. But did you know that sending astronauts to Mars is an actual goal of NASA scientists? In celebration of recent NASA projects that will one day send humans to Mars, let's explore the red planet from home!

This activity is best for grades 6+ and explores negative number calculations, weather terminology and animal adaptations.

HANDS-ON STEM EDUCATION

PCS

For over 30 years, PCS Edventures has inspired students to develop a passion for Science, Technology, Engineering and Mathematics (STEM), focusing our efforts on making learning and discovery a fun and interactive process for grades K-12.

- Classroom
- After-School
- Home Learning

The Red Planet

Mars is often called the "Red Planet" because it is close enough to Earth for us to see its red color with the naked eye. Our planet's neighbor in the solar system has captured astronomers' imaginations for years. Some records about Mars are over 4,000 years old.

Mars is also the planet that scientists have searched the most for alien life. This is partially because Mars has similar surface features to Earth, such as valleys, deserts and polar ice caps.

Life on Mars

It was long believed that intelligent life may exist on Mars. One famous example is the story of Orson Welles's 1938 radio play adaptation of *The War of the Worlds* by H.G. Wells. At the time, radios were as common in American households as TVs are today. People would listen to broadcasts at specific times of day, just like modern TV shows.

The broadcast began as a normal radio show, starting with a mundane weather report. Soon, the broadcast was interrupted by a report that explosions were detected on Mars. Then, a large meteor crashed into a farmer's field in New Jersey. Soon after, strange creatures emerged from the crash site. Earth was being invaded by Martians! Even though the story was fictional, the radio play was so realistic that some people believed it was actually happening!

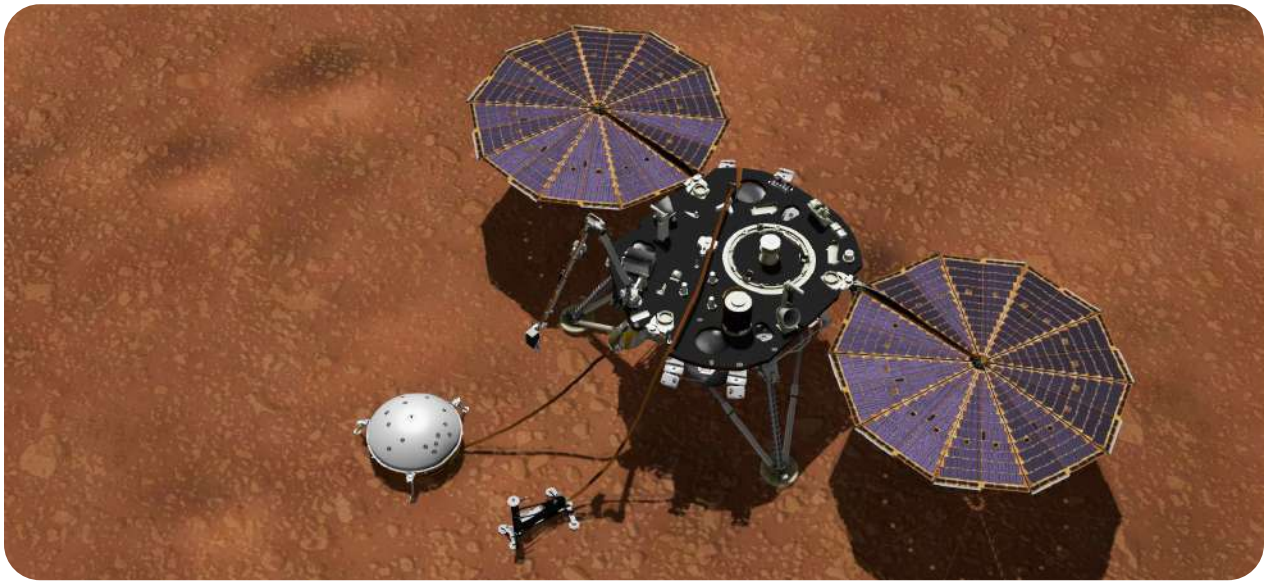
In reality, no life has been discovered on Mars at the time of publishing. However, NASA does have plans to send astronauts to Mars! First, the Artemis program will send the first woman and the next man to the moon by 2024. Then, the Explore Moon to Mars project will use information from Artemis to send humans to Mars.

Weather on Mars

On Earth, we can prepare for the day by checking the weather outside and watching the weather forecast. The daily weather helps us decide what to wear, where to go and how to get there.

What the weather is like in a certain area over time is known as the area's **climate**. The climate affects how entire communities are built. For example, stilted houses are common in areas that often experience floods. These buildings are lifted above the ground with large stilts to protect them from floodwaters.

Just like how the weather affects us on Earth, the weather on Mars must be studied to prepare for missions. Since 2019, the public has had access to real-time Mars weather data from NASA's InSight lander. The InSight lander is located in the Elysium Planitia, which is a flat plain near Mars's equator. This lander collects data throughout each **sol**, one day on Mars. This data allows scientists to spot patterns and filter out environmental "noise" when looking for marsquakes.



Key Terms:

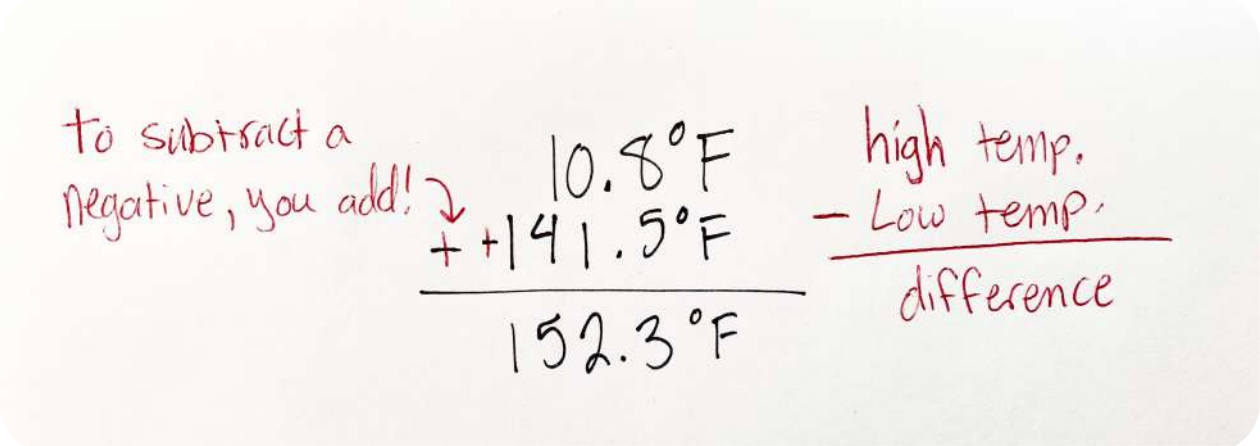
- **Atmospheric pressure:** force per unit area exerted by the mass of the atmosphere as gravity pulls it to Earth.
- **Temperature:** the degree of hotness or coldness measured by a thermometer with a numerical scale.
    - **Fahrenheit Scale:** scale for measuring surface temperature used by Belize, Liberia, Myanmar and the United States. Water freezes at 32 degrees Fahrenheit.
- **Wind:** movement of air from a high-pressure area to a low-pressure area caused by the uneven heating of the Earth by the sun.

Understanding Martian Weather

Let's explore Martian life and weather by examining real data from NASA's InSight lander! Use the data charts provided on page 6-7 to answer the questions. Or, look up the current data from NASA here: https://mars.nasa.gov/insight/weather/

1. Look at the daily weather report for Mars. Calculate the difference between the high and low temperatures for each day.

Example: On 11/9/2020, the difference was 152.3 degrees.



2. How does the weather on Mars compare to the weather in your area? Remember to compare data from the same season. The dates of Mars and Earth seasons don't always match up!

3. Take a look at the *Mars Weather and Climate from the InSight Mission* table, which shows how 5 different weather elements have changed over time. Focus on **temperature, pressure** and **wind speed**. What trends can you identify?

Consider:

- What happens to the wind speed when the pressure changes?
- What happens to pressure when the temperature changes?
- What is each measurement doing during each season?

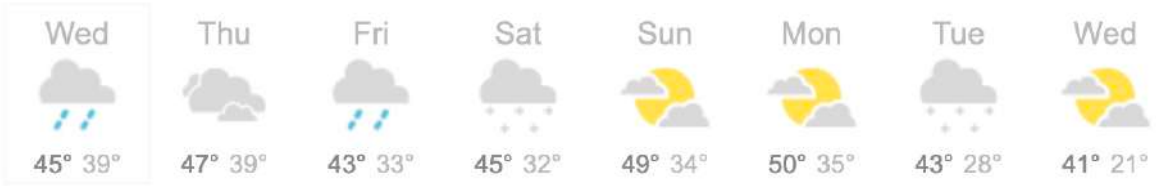
4. What sorts of weather events happen on Mars? Think about what weather events happen in your area. Do you get rain, wind, snow, hail, etc.? Which of these does Mars experience?

To learn more about the climate on Mars, start here: https://nineplanets.org/

Create a Martian Weather Report

Using the information you have gathered, create a Martian weather report! Use any materials you have around the house to create a TV news broadcast, complete with a Martian newscaster.

1. Draw some symbols to represent Martian weather events. Take inspiration from the example, or look up the weather report for your area.



2. Design a Martian to be the newscaster. Consider how the climate on Mars might change how your Martian looks.

To get started, consider some common adaptations found in animals that live in cold climates on Earth:

- Larger bodies help animals retain heat.
- Small ears and tails are less likely to get frostbite.
- Thick fur coats keep animals warm in the winter.
- Some animals store fat to keep them warm and go for long periods of time without food.

3. Present or record your Martian weather report!

Extension: Earth Invasion!

Listen to Orson Welles's 1938 radio play adaptation of The War of the Worlds by H.G. Wells: https://youtu.be/OzC3Fg_rRJM, or read the transcript: https://www.sacred-texts.com/ufo/mars/wow.htm

Then, write a report of an invasion from Earth to interrupt your Martian weather broadcast!

Daily Weather Report

Time		Air Temperature (°F | °C)			Wind Speed (mph | m/s)				Pressure (Pa)		
Date	Sol	Max.	Avg.	Min.	Max.	Avg.	Min.	Direction (most common)	Max.	Avg.	Min.
Nov. 11, 2020	697	-° F	-° F	-° F	-	-	-	n/a	754.1	732.9	710.5
Nov. 10, 2020	696	-° F	-° F	-° F	-	-	-	n/a	756.1	737.9	706.9
Nov. 9, 2020	695	10.8° F	-75.4° F	-141.5° F	-	-	-	n/a	757.1	737.6	713.9
Nov. 8, 2020	694	14.9° F	-70.3° F	-156.5° F	-	-	-	n/a	753.7	734.6	710
Nov. 7, 2020	693	9.7° F	-88.6° F	-142° F	49	14.3	0.6	WNW	759.1	738.6	713.2
Nov. 6, 2020	692	13.1° F	-86.7° F	-142.2° F	47.8	12.7	0.5	W	754.6	737.1	711.6
Nov. 5, 2020	691	3.1° F	-78.4° F	-142.6° F	49.1	16.8	1.8	WNW	758.4	740.8	713.1

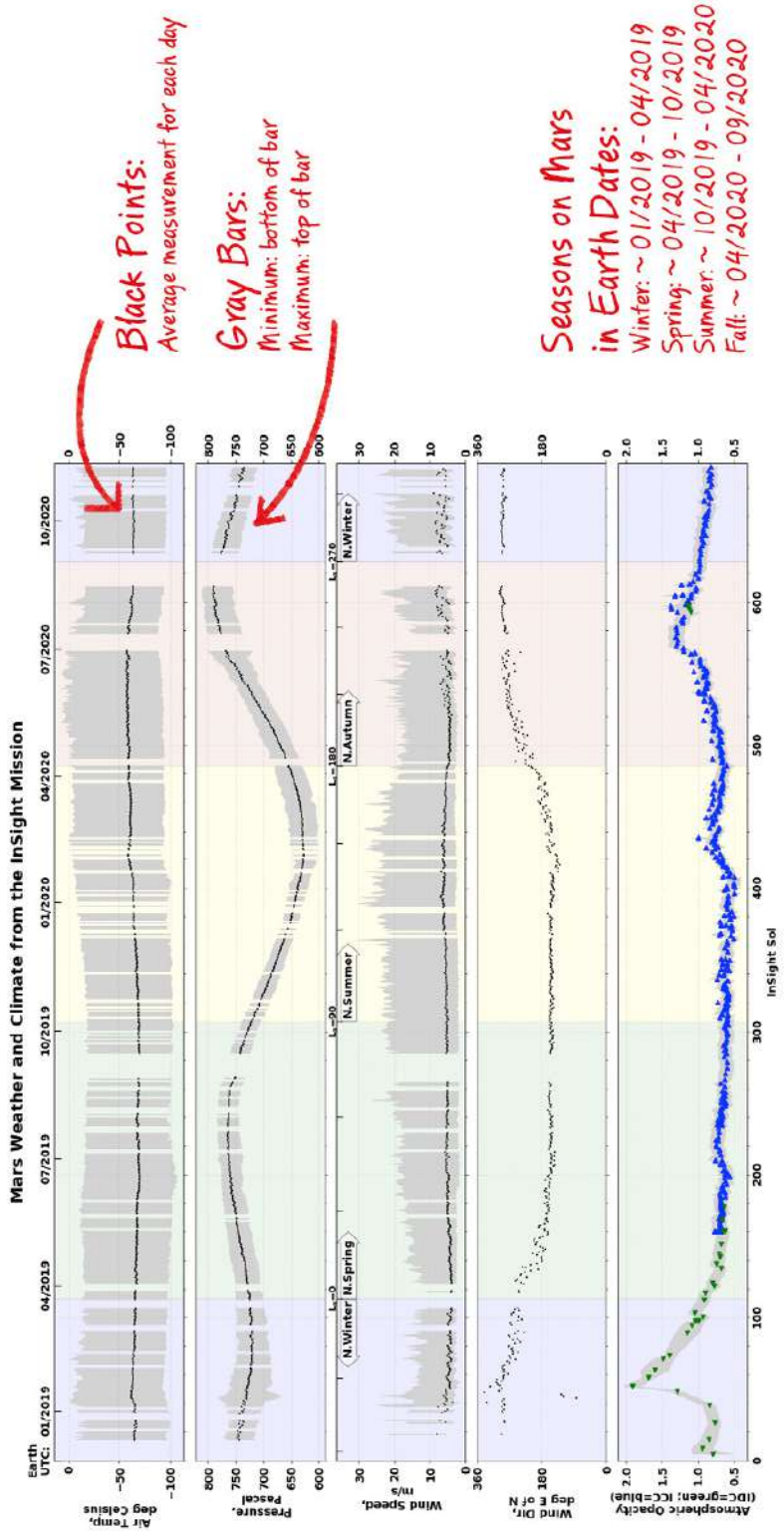
As more data from a particular sol is downlinked from the spacecraft (sometimes several days later), these values are recalculated, and consequently may change as more data is received on Earth.

Earth Date

Mars Date
(day of the Martian year)

Wind Direction
(ie. West-North-West, West)

InSight Data Charts



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Featured Products

Science, Technology, Engineering, Arts and Math subjects are all critical to space travel! Check out these hands-on STEM and STEAM programs for elementary, middle and high school learners:

Discover Robotics & Programming I combines an application-based curriculum with high-quality building pieces to create the ultimate learning experience. This scaffolded series teaches basic programming through engineering challenges, enabling students to gain 21st-century skills like creative problem-solving and computational thinking. With materials available for student-driven and instructor-driven environments, this flexible program empowers educators to integrate hands-on STEM into any educational setting.

In Discover Drones, your learning environment will experience first-hand the fast-growing technology of Drones. Students begin by building their RubiQ drone through scaffolded lessons in engineering, iterative design and applied science. After learning the safety regulations surrounding unmanned aerial vehicles, they'll become comfortable flying in a training simulator before moving onto line-of-sight piloting. Then students don their FPV goggles and experience exactly what super-charged STEM is like.

In BrickLAB STEAMventures: BUILD Helicopters, join Edie on a rescue mission in a helicopter! Learners engage in hands-on projects as they explore the science of helicopter flight and the many ways that helicopters are used around the world, and even on Mars! Examine the unique features of helicopters and discover what makes them the perfect flying machine for search and rescue, traffic monitoring, space exploration and more.

For more information, visit https://edventures.com/collections
or contact a STEM Program Specialist at (800) 429-3110

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